Brian Kopp, Ph.D.
The Semaphore Group
229 South 5th Street
Fernandina Beach, FL 32034
Telephone: 904-206-3453
Email: brian@thesemaphoregroup.com
Website: www.thesemaphoregroup.com

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Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: GN Docket No. 12-91

COMMISSION SEEKS COMMENT ON EMERGENCY COMMUNICATIONS BY AMATEUR
RADIO AND IMPEDIMENTS TO AMATEUR RADIO COMMUNICATIONS

Dear Ms. Dortch,

In response to the subject Docket I have prepared the following comments regarding Question 1. This is
the first of two questions posed by the FCC and addresses the importance of emergency amateur radio
service communications with 10 sub-questions. Responses have been prepared for seven of the sub-
questions. The responses are mostly of an informative nature with a few suggestions given were
appropriate.

On background, I am an amateur radio operator and I hold an Amateur Extra Class license. I am also the
Amateur Radio Emergency Services (ARES) Emergency Coordinator for Nassau County, Florida. I have a
Ph.D. in Electrical Engineering and work as a self-employed communications engineer, providing
consulting services to public safety and other government agencies.

**Question 1a addresses examples of disasters or emergency situations in which amateur radio can
serve.** In Nassau County Florida, the amateur radio community works through the American Radio Relay
League (ARRL) ARES program and is focused on supporting the public safety community and the medical
community by providing emergency communications for shelter operations and providing back-up
communications in support of many emergency scenarios. As a Florida coastal county we are concerned
about tropical storms and hurricanes, but we are also concerned about other natural disasters that
occur in the area including wild fires and tornados.

Nassau County Emergency Management (NCEM) relies on ARES to staff any opened emergency shelters
in the county and to provide back-up communication links to the county emergency operations center
under any disaster scenario that requires the shelters to be opened. Nassau County Emergency
Management also relies on ARES to help maintain and operate non-amateur radio communications

resources including satellite phones, cellular telephones, and the equipment in the Nassau County Emergency Command Trailer.

In addition, Nassau County ARES has also participated in Mass Casualty Incident (MCI) drills with the only hospital in the county to provide back-up communications support. These drills help the hospitals meet there state statute requirements for practicing emergency responses. Amateur radio participates by providing assistance with redundant and back-up communications from a command post to the hospital emergency room and triage areas.

Through these drills Nassau County ARES also maintains familiarity with hospital operations which may be useful during an MCI. Many medical communities in the United States have anticipated that during an MCI (natural or man-made) hospital staff and hospital phone systems may become overwhelmed. Amateur radio can provide in-hospital back-up communications should the phone system become overwhelmed.

Man-made disasters have also been discussed with NCEM. Nassau County is adjacent to the King's Bay, Georgia US Naval Facility and to the Mayport, Florida US Naval Facility. In addition, Interstate I-95 and several very active freight railroad lines pass through Nassau County. All of these features pose risks to the citizens and property of Nassau County in the event of a manmade disaster such as a railroad tanker hazardous material spill, or nuclear accident. Amateur radio may be called upon to staff shelters or the command trailer during any such event.

Question 1b addresses circumstances under which amateur radio provides advantages or compliments other forms of communications. Nassau County ARES takes a pragmatic approach to emergency communications technologies, in particular in working with NCEM. In our work to support NCEM we recognize that if the telephones and/or the internet are working at a shelter, it is likely to be the most efficient technology for sharing information with the County Emergency Operations Center (EOC). In addition, NCEM maintains radio watches on VHF, UHF, and 800 MHz public safety channels and relies on Nassau County ARES to operate those radios in the EOC radio communications room. In addition, Nassau County ARES and NCEM recognize that amateur radio is only one tool in the communications tool box and that during emergencies it is better to have a well trained emergency communicator who is familiar with all of the tools rather than just amateur radio.

Amateur radio does pose some advantages over other communications assets during an emergency. The advantage of communicating over a shared radio channel, compared to a point to point telephone circuit, is that everyone listening will receive the information and be better informed. As long as protocols are in place to avoid transmitting sensitive information, this process works well. The same is true for shared radio channels sending voice or data. An example of where this is an advantage is in giving hourly reports from emergency shelters. Idle shelters who hear over the radio that a nearby shelter is being overwhelmed may be able to offer assistance. There are procedures in place to use either amateur radio or NCEM talk groups on the county's 800 MHz radio system for shelter operations and both radios would possibly be operated by ARES personnel at shelters and in the EOC

communications room. It is envisioned though that during an actual emergency, ARES would rely more on amateur radio channels to help reduce traffic on the limited 800 MHz channels.

While the internet, like the fax machine, can offer security in transmitting sensitive information via email or Short-Message-Service (SMS), they are both vulnerable to the condition of the telecommunications infrastructure in the area. During many disaster scenarios there is a significant chance of either intermittent or long term telecommunications service interruptions. Some amateur radio data communications techniques, in particular a primary technique used by Nassau County ARES called SEDAN, do not use the internet and are therefore much more resilient from an availability and reliability standpoint.

Question 1d addresses state and local plans that include amateur radio. The State of Florida, under former state emergency manager Craig Fugate's leadership established a strong relationship between the state EOC and the amateur radio community. The lead communications experts working in the state EOC are amateur radio operators. Conducting regular communications nets with the state EOC on amateur radio frequencies using various amateur radio modes has been an invaluable way of maintaining a strong relationship between the amateur radio community and the State of Florida. In addition, including amateur radio in regional and state wide training events and drills has also helped ensure that all of the emergency management stakeholders are aware of the amateur radio assets that are available and how to work with them.

At the county level here in Nassau County, Florida, by working with NCEM to address their emergency communications needs, rather than just offering amateur radio as a stand-alone service, Nassau County ARES has filled a need that many financially burdened counties may be able to take similar advantage of. To be sure, amateur radio is a significant aspect of the service ARES provides, but by also helping NCEM with such seemingly minor tasks as keeping emergency cell phones charged and tested in the County EOC, ARES provides the county with what it really needs: a complete emergency communications resource.

Establishing this program took time. NCEM had to develop faith and trust in ARES. Small efforts by ARES, for instance helping assess aging radio inventories for narrowbanding, or working with satellite phone vendors to update authentication and frequency information in the NCEM satellite bag phones are ways that we built trust with NCEM. Offering to test, rehabilitate and maintain the EOC radio systems are an additional step we took. One of the most significant ways in which NC ARES helped NCEM was to rehabilitate every shelter in the county by installing a new amateur radio base station antenna for use during emergencies. The county paid for the materials and ARES provided the labor rehabilitating 6 shelters over a one year period. The key to the success of such a program is in maintaining the posture that NCEM is a served agency and we as amateur radio operators are there to help them. Many programs like this fail because the local amateur radio community fails to recognize that they serve at the pleasure of their served agencies. As such it is important to focus on what it is the served agency needs rather than what we as amateur radio operators can do for them.

The ARRL emergency communications training courses emphasizes this pragmatic aspect of emergency communications: That amateur radio is only one tool and many times may not be the right tool for emergency communications. In addition, the training stresses that by building a strong relationship with your served agency you will ultimately succeed in being able to offer them the emergency communications services they need.

Question 1f addresses training and training standards for emergency communications. The availability of the National Incident Management System (NIMS) and Incident Command System (ICS) training courses has been invaluable to the amateur radio emergency communications community. Having these courses available online for free, in a self-paced format is the best way to ensure that amateur radio emergency communicators will be trained to assist during emergency responses. The ARRL course on emergency communications is also very good and focuses on dove-tailing amateur emergency communications with NIMS/ICS. The ARRL course is also available as a self-paced online course but it is not free. If the FCC could facilitate the development of a free online course focused on emergency communications it would be a significant addition to the training courses that are available to many amateurs who don't have the financial freedom to take the ARRL course. The FCC could also participate in the dissemination of information regarding the National Interoperability Field Operations Guide by advocating the inclusion of amateur radio assets in the guide. An associated public safety awareness education program would be useful as well.

Question 1g addresses communications capabilities used by amateurs during emergency communications. It is important to note again here that the concept of emergency communications is most successfully implemented when the amateur radio operator considers that other non-amateur radio technologies may be available. The internet, the fax machine, the telephone, commercial pagers, voice and data commercial land-mobile radio services (public safety and industrial-commercial), federal radio channels (where authorized for use during a disaster), satellite telephone, and unlicensed communications technologies all have their place in emergency communication responses. It is therefore important to recognize that a review of amateur radio capabilities should not be considered a comprehensive look at how amateur radio views emergency communications.

Regarding amateur radio capabilities, the primary means of reliable emergency communications used by amateurs supporting small scale emergency events is wideband Frequency Modulation (FM) voice communications via either a local repeater or simplex on either the Very High Frequency (VHF) or Ultra-High Frequency (UHF) amateur bands. This communications mode is very useful for short distance tactical communications but it is not as reliable for administrative or logistical communications where specific data is to be transmitted.

For larger scale emergency events, such as earthquakes and hurricanes, the primary means of reliable emergency communications used by amateurs is Single Side-Band (SSB) modulation voice communications via simplex on High Frequency (HF) bands. This communications mode is very useful for medium and long distance tactical communications out of a disaster area but it is also not as reliable for logistical communications where specific data is to be transmitted.

To send more data-centric communications, such as logistical information, the most reliable means of transmitting data communications via amateur radio is still simplex packet transmission. This technique was developed in the late 20th century and is still considered highly available and reliable. There are many packet protocols available and most are freely available to amateur radio operators. There is no current standard for emergency communications using packet transmission via radio and this is an area that the amateur radio community needs to focus on.

There are other data modes that have been developed in the last 10 to 20 years and they do offer some advantages over traditional packet transmission. The most well known of these may be D-Star, a proprietary technology developed by ICOM. D-Star permits both voice and data transmissions on multiple bands, and uses repeaters to extend the range of operation. Another digital mode that is popular is Winlink. This protocol provides email services permitting hams to send messages to each other.

While D-Star and Winlink offer some functional advantages over traditional packet radio they both suffer from a significant disadvantage compared to traditional packet radio when considered for emergency communications: They rely on the internet to achieve maximum performance. When the internet is intermittent or not available, these services will not perform at their full capability and may actually suffer debilitating performance degradation. This is a significant issue for D-Star in particular since it is actively being used in the amateur radio community for emergency communications here in North Florida and in other areas of the country.

Amateur radio digital modes that rely on the internet are of less value for emergency communications for another very simple reason. If the internet is functional then email and SMS services may also be available, which may mean that amateur radio digital modes are not needed for emergency communications. In addition, if the internet is functional, it may also mean that the telecommunications infrastructure in general is functional and telephone services are available. This may reduce the immediate need for amateur radio voice modes as well.

Regardless of the digital modes that are used, the amateur radio community will have very limited success deploying them for emergency communications unless they train with these modes operating under realistic network conditions. These conditions must include network node failures and internet service failures. This has not been the case with recent training exercises in North Florida. Most of the drills and training exercises that have taken place have not assumed any degradation in the networks associated with digital modes. This is a significant area for improvement that the amateur radio community must focus on if D-Star and Winlink are to be successfully used for emergency communications during any disaster scenario.

There is a packet radio digital mode in use widely in the state of Florida for emergency communications that does not suffer from the disadvantage the digital modes mentioned above do. The Southeastern Emergency Digital Asociation Network (SEDAN) uses store-and-forward packet communications to pass short digital messages over short or long distances. This digital mode utilizes a mesh network of standalone radio nodes that can talk to each other and to end users without using the internet or any

other interconnections. The mesh structure ensures a path is always available. The SEDAN network is supported by the state EOC and is the preferred digital mode for use in emergency digital communications by Nassau County ARES. An additional advantage of this mode is that it uses chains of VHF links between nodes to communicate over long distances thus overcoming some of the propagation issues associated with the use of HF radio for long distance communications.

Question 1h addresses national standards and restrictions regarding transmission speeds. As the amateur radio services continue to play an increasing role in supporting emergency communications there will be a commensurate increase in the data needs associated with the effort. Broadband video and data services will be a component to this effort. As an example, during a recent regional emergency drill in northeast Florida a request was made to transmit the floor plans for a cruise ship that had "capsized", via amateur radio digital modes. Such a request is a significant challenge for most currently deployed amateur radio digital modes because they are optimized for operation using narrow bandwidths.

Question 1i addresses interconnecting amateur radio with public safety and medical communications systems. Nassau County ARES has achieved a certain level of interoperability with public safety and medical communications systems by becoming the emergency communications operators in the county EOC and in the NCEM command trailer. As directed by NCEM and using NCEM radios, specific Nassau County ARES amateur radio operators monitor and when necessary transmit on land mobile radios associated with public safety activities. These radios include VHF mutual aid channels, UHF medical channels (MED Channels), and 800 MHz county public safety radio channels. Since these specific Nassau County ARES radio operators are also communicating over amateur radio channels with other amateur radio emergency communications operators that may be stationed for instance at an emergency shelter, a level of interoperability is obtained. The key to making this work is that the specific amateur radio operators who communicate on public safety and medical communication systems have to coordinate closely with NCEM, clearing all transmissions with them. This level of interoperability may be sufficient to avoid addressing the complications associated with cross-patching amateur radio channels with public safety or medical radio channels.

Please feel free to contact me to discuss any of these comments further.

Respectfully,

Brian T. Kopp, Ph.D.

Nassau County, Florida ARES Emergency Coordinator

FCC Amateur Radio Call Sign: KC5LPA